

**Karaktärisering av slam – Sedimenterings-  
egenskaper –**

Del 2: Bestämning av sedimentation

**Characterisation of sludges – Settling properties –**  
Part 2: Determination of thickenability

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## Characterisation of sludges - Settling properties - Part 2: Determination of thickenability

Caractérisation des boues - Propriétés de sédimentation -  
Partie 2: Détermination de l'aptitude à l'épaississement

Charakterisierung von Schlämmen - Absetzeigenschaften -  
Teil 2: Bestimmung der Eindickbarkeit

This European Standard was approved by CEN on 3 February 2006.

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## EN 14702-2:2006 (E)

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## **Foreword**

This document (EN 14702-2:2006) has been prepared by Technical Committee CEN/TC 308 "Characterisation of sludges", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2006, and conflicting national standards shall be withdrawn at the latest by September 2006.

Another part of this European Standard is:

- Part 1: Determination of settleability (Determination of the proportion of sludge volume and sludge volume index).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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### **Introduction**

Determination of the thickenability, i.e. the further concentration of suspended (undissolved) sludge solids in settling under gravity, through the use of laboratory mechanical assisted cylinders is negatively affected by bridging, wall effects and particle size effects. Ideally, this parameter should be measured in large-diameter columns having the same depth as the prototype thickener, but above effects can be satisfactory overcome by introducing a low-speed stirrer in a cylinder; this also helps to reduce the effect of the shallow depth.

## 1 Scope

This document specifies a method for the determination of the thickenability of sludge suspensions. This document is applicable to sludge suspensions from:

- storm water handling;
- urban wastewater collecting systems;
- urban wastewater treatment plants;
- treating industrial wastewater similar to urban wastewater (as defined in Directive 91/271 EEC);
- water supply treatment plants.

This method is also applicable to sludge suspensions from other origin.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1085:1997, *Waste water treatment — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1085:1997 and the following apply.

### 3.1

#### **thickenability**

ability of sludge solids to further concentrate in mechanical assisted settling under gravity

### 3.2

#### **stirred sludge volume**

volume of the sludge suspension after settling under specified stirring conditions

### 3.3

#### **stirred sludge volume index**

quotient of sludge volume by the concentration by mass of dry matter in the sludge, measured in a stirred cylinder

## 4 Principle

The thickenability is determined by the proportion of the total volume occupied by the sludge in a sludge suspension within 30 min after settling under gentle stirring in standard apparatus and under standard conditions.

## 5 Interferences

Settling properties vary with the solids concentration. Therefore, the comparison of these properties of sludge suspensions having different solids concentrations is allowed if a reference concentration is assumed; the

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value of 3,5 g/l has been found to be the optimal one [1]. Settling properties evaluated at this solids concentration value also correlate well with the maximum solids loading at which that sludge may be applied to a tank without loss of solids in the effluent.

Interference occurs when there are fairly large temperature differences between the temperature of the sample and the ambient temperature as a result of convection and formation of gas bubbles. With differences of more than 5 °C it is advisable to place the settling cylinder with the sample in a bucket filled with the sample fluid.

### 6 Apparatus

**6.1** graduated cylinder, diameter 10 cm, measuring height 50 cm, nominal volume 3 500 ml, made of glass or transparent plastic, equipped with a low speed stirrer at 1 rpm. The stirrer is in [1] (Annex A (informative)).

**6.2** scoop, nominal volume 5 l.

### 7 Procedure

A representative sample of sludge suspension is taken by the scoop and immediately poured into the graduated cylinder up to the 50 cm mark. For this purpose, a scoop holding 5 l is used. Start the stirrer and record the level of sludge-water interface in the cylinder after 30 min.

For measurements at the reference concentration of 3,5 g/l, sludge samples shall be obtained through dilution by supernatant liquor followed by gentle homogenisation.

### 8 Expression of results

The stirred sludge volume ( $V_{ss}$ ) is obtained as the quotient of the sludge volume after stirring (Clause 4) by the volume of the initial sludge sample volume. It is given in millilitres by litre as an average of at least two measurements.

The stirred sludge volume index ( $I_{ssv}$ ) is calculated from the equation below:

$$I_{ssv} = \frac{1000 \times H}{(50 \times C_0)} \text{ where}$$

$H$  is the final sludge level in centimetres;

$C_0$  is the initial solids concentration, in grams per litre (see EN 12880);

50 is the starting height of sludge suspension, in centimetres;

1 000 is a conversion factor.

NOTE For activated sludges, plant values of  $I_{ssv}$  at 3,5 g/l lower than 80 ml/g are indicative of good thickenability, while values higher than 120 ml/g of poor thickenability.

### 9 Precision

Results of validation trials are summarized in Annex B (informative).